



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2005NJ91B

Title: Resistance of Fractured Rock Dechlorinating Bacteria to Pressure from Heavy Metals

Project Type: Research

Focus Categories: Groundwater, Methods, Water Quality

Keywords: groundwater, degreasers, chlorinated ethene, tetrachloroethene, (PCE), trichloroethene, (TCE), groundwater, contaminants, chlorinated solvents, remediation, aquifers

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Abstract

Because of their extensive use as degreasers, chlorinated ethenes such as tetrachloroethene (PCE) and trichloroethene (TCE) are the most frequently found groundwater contaminants. The remediation of chlorinated ethenes-contaminated aquifers is a difficult proposition that is further complicated by the presence of heavy metal co-contaminants. Up to 60% of CERCLA sites contain heavy metals along with other contaminants and the DOE has identified heavy metals and TCE as a common contaminant mixture at their sites. In a 1994 list of the twenty most common groundwater contaminants compiled by National Research Council, six are toxic metals and ten are chlorinated organic compounds

Microbial reductive dechlorination which transforms chlorinated ethenes to the benign product ethene is an attractive remedial process for contaminated aquifers. In situ bioremediation using enhanced anaerobic reductive dechlorination is important for

cleanup of environments contaminated by chlorinated ethenes and has been used as an alternative to chemical or physical methods. Only one genus of bacteria, *Dehalococcoides*, has been identified which is capable of the complete dehalogenation from tetrachloroethylene (PCE) to ethene through serial reductive dechlorination. These microorganisms have been found to be distributed widely in the environment and to play a crucial role in determining dechlorination potential of the chloroethene-contaminated sites.

The primary goal of this study is to investigate the effect of heavy metals on the dechlorination potential in groundwater contaminated with both chlorinated ethenes and heavy metals under anaerobic condition.